DOCUMENT RESUME

ED 273 249 IR 012 248

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TITLE Using Microcomputers in Evaluation. Microcomputer Applications: Spreadsheets.
PUB DATE 18 Oct 85
NOTE 9p.; Paper presented at the Annual Meeting of the Evaluation Network (Toronto, Canada, October 18, 1985).
PUB TYPE Reports - Descriptive (141) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Computer Software; *Data Analysis; Data Collection; Documentation; *Evaluation; *Evaluators; Microcomputers; Technological Advancement
IDENTIFIERS *Spreadsheets

ABSTRACT

Evaluators, by the nature of their work, must be concerned with data management activities ranging from the collection and recording of data to the analyses, summation, and presentation of those data. Though word processing has been cited as the most frequently used microcomputer package by educational evaluators, spreadsheets are among the most popular packages sold to business users. These spreadsheet packages can also offer significant benefits to evaluators. These packages offer better in-program documentation, the capacity to facilitate data entry and editing for processing by mainframe packages, and data summation capabilities in the form of graphics and simple descriptive statistics. Other uses include the development of data entry and analysis templates for use by other evaluators wishing to replicate a study's methodology. (Author)

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Using Microcomputers in Evaluation

Microcomputer Applications: Spreadsheets*

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* Prepared for delivery at the Annual Meeting of the Evaluation Network, Toronto, Canada, October 18, 1985

Introduction

ABSTRACT

Evaluators, by the nature of their work, must be concerned with data management activities ranging from the collection and recording of data to the analyses, summation, and presentation of those data. Though word processing, has been cited as the most frequently used microcomputer package by educational evaluators, spreadsheets are among the most popular packages sold to business users. These spreadsheet packages can also offer significant benefits to evaluators. These packages offer better in-program documentation, the capacity to facilitate data entry and editing for processing by mainframe packages, and data summation capabilities in the form of graphics and simple descriptive statistics. Other uses include the development of data entry and analysis templates for use by other evlauators wishing to replicate a study's methodology.

Evaluators, by the nature of their work, must be concerned with the dificulties associated with the management of data sets. These data management activities ranges from the collection and recording of data to the analyses, summation, and presentation of the data.

Until recently, these tasks were performed on large mainframe or timesharing minicomputers.For the most part, keypunches and on-line terminal devices, have been used for data entry tasks, statistical packages such as SPSS or SAS have been useful for the data analysis and summation phases, while word processing packages are available for the actual report preparation. Within the past five years, the improvement in the microcomputers and their software packages have made sufficient progress as to be capable of replacing the larger computer for many of the evaluator's data management tasks.

Despite the power of the small machines, personal computers appear to play a relatively small role in the researcher's data management activities. According to the survey conducted by the Microcomputer SIG of the American Educational Research Association, wordprocessing was the most frequently cited use of personal computers[91% of the 171 respondents to their survey] with database management a somewhat distant second[71% of the respondents](Microcomputer SIG Newsletter No.4, January, 1984).

Spreadsheet software has been among the most popular form of business software sold in recent years, with such packages being available for every brand of business sized microcomputers

as well as minicomputers offering "Executive Software". Yet only 59% of the previously cited respondents (Members of the AERA SIG), reported its use in contrast to the much higher reported use of wordprocessing software.

A spreadsheet is a computer program which makes an electronic piece of "columnar paper" available to the user and which can accept text, numeric, or arithmetic formula data in any one of the row or column "cells" in the spreadsheet. It closely resembles the spreadsheet used by the accountants for the recording of financial data and permits the entry of data as well as notes which document the data source. These spreadsheets which were originally developed to aid business people record and analyze financial data, have proven to be useful for any application which requires the recording or manipulation of data in the form of a "list" or file.

The following pages provide an overview of some of the uses to which spreadsheets and their associated software can be put to use by evaluators.

Documentation

When using other forms of computer software, whether programming in a specific language or using a package such as SPSS, documentation of the program and the data itself is frequently clumsy and requires adherence to the rules associated with the program. Usually, some special character or word is required to specify that the line of text is a "Comment" or "REMark", and such comments are limited to specific locations

within the coding line. These restrictions in conjunction with the distaste of computer people to document their work, frequently result in, a program which must be rewritten each time it is used, or, output over which one writes the notes or remarks which should have been written into the program. Spreadsheet packages permit extensive labeling of all activities as well as the capacity to insert documentation wherever or whenever it is appropriate.

Data Entry

The earliest form of data entry to mainframe packages is the keypunch, but this technology is rapidly being replaced at most installations by the on-line terminal using an editing program. These Editors make the entry and correction of data somewhat easier, but still assume that most data entry requires little or no interperetation on the part of the data entry operator, and that the data is relatively error free. If the computer is to provide some initial level of error detection, the user must locate or prepare a sophisticated data entry and review program. In contrast, the more sophisticated microcomputer packages utilize a language unique to the package. These packages can direct the computer to accept only a particular type of data, b) accept no more than a specific number of characters in a particular field, c) automatically move the cursor from field to field in accordance with the pre-programmed instructions. In many cases, these pre-programmed instructions permit the spreadsheet user to design a data entry

layout which replicates the appearance of the data collection form. Then one simply "copies" the data from the paper form to the computer form and the program automatically transfers the contents from the data entry portion of the spreadsheet to the database portion elsewhere in the spreadsheet. This approach provides the friendliness and accuracy of keying from the original data collection form, the practicality of visually checking the data at entry time, and the accuracy of using the computer to check the data without the necessity of writing a separate program to perform those functions.

An additional data entry feature, is the spreadsheet package's ability to convert the data into a simple ASCII data file for transport to other computers or software packages which read files in a list format. Thus even if one does not take advantage of the spreadsheet's computational abilities, its data entry features can make it worth the effort to purchase and use.

Data Editing

The task of data editing consists of two phases, the review and identification of errors in the data, and then the correction of those errors. Card input requires a review of the card listing, identification of the card(s) containing the errors, and then repunching the entire card. Line editors also require a review of a listing and then the use of line editing commands to replace the error with the correct data. Spreadsheet

packages permit one to scroll through the entire worksheet until an error is found and then proceed directly to the cell containing the error. Corrections are completed by simply deleting the errors, retyping the correct data into a cell. An additional feature is the ability to enter only unique data to the data base and then "Copy" or Replicate the data into all other cells or fields containing the same data. This feature is considerably more practical than the Cut and Paste feature available in most editors or word processing packages.

Data Summary

Ultimately, the other features are of less value if one must continue to process all data on a mainframe. If sophisticated statistical processing is unnecessary, packages such as Lotus 1-2-3 support the following statistical functions:sums, average, variances, standard deviation, and frequency distributions. Additional statistical analyses may require supplementary packages such as those provide by Statsoft Corporation which utilize the data from spreadsheet templates and offers Crosstabs, Multiple Regression, ANOVA and ANCOVA, as well as some non-parametric tests and graphics. The Background Development Company provides a module which performs Multiple Regression analysis on spreadsheet developed data, and the Lotus Corporation is announcing a new release(Release 2) which will provide enhanced graphics, new logical functions, regression analysis, matrix inversion and transposition, and additional macros. For those evaluators who wish to use graphics to aid in

the explanation of the data, packages such as Lotus 1-2-3 and Appleworks are integrated or multi-purpose packages which provide some graphics as well as spreadsheet capabilities.

Other Uses

Packages such as Lotus 1-2-3, Symphony, and Framework all provide some additional commands called macros which permit the user to "program" the spreadsheet so as to aid in the data entry or summation process. Such macros are routinely described in journals such as PC World, Byte, and others, as frequently as other programs in languages such as BASIC or C appear in other journals. In fact, some authors have implied that programming in a spreadhseet language has become so prevalent as to make the package a defacto standard for many new applications. The most apparent impact of the pervasiveness of macros is in the availability of spreadsheet templates to perform various tasks from desktop management to tax preparation. Such templates are available as public domain software(Boston Computer Society), through non-profit agencies such as the National Center for Higher Education Management Systems which offers templates for enrollment forecasting, faculty database management, and finanacial planning and assessment, and private software houses which sell templates for the analysis of commercial credit(Topwalk Associates, McClean VA), Desktop Time Accounting Systems(Computer Software Consultants, Binghampton NY,) and Tax Planning, Project Management(Breakthrough Software). Templates for the management of pupil data, though not identified in the literature, are likely to appear soon.